0.5
B7
B
Se

NOV 18 1927

LIBRARY
UNIVERSITY OF MICHIGAN
ANN ARBOR MICH.

Educational Research Bulletin

(Registered in United States Patent Office)

Vol. VI NOVEMBER 9, 1927 No. 16

TABLE OF CONTENTS

A Vocabulary Study of the English and Metric Units of Measure Used in Secondary-School Science Textbooks, *Oscar Himebaugh* 339

Accomplishments of the Child-Health Demonstration of Mansfield and Richland County, Ohio.....*Glenn G. Rohleder* 342

Editorial Comment:
A Student Speaks..... 348

A Table to Facilitate the Calculation of the Probable Error of the Mean....*Harold A. Edgerton and Herbert A. Toops* 351

On the Firing Line..... 355

Educational Readings..... 357

New Tests..... 360

THE OHIO STATE UNIVERSITY
COLLEGE OF EDUCATION
GEORGE F. ARPS, *Dean*

EIGHTH ANNUAL EDUCATIONAL CONFERENCE

PROGRAM COMMITTEES

EXECUTIVE COMMITTEE

GEORGE F. ARPS.....*Chairman*
T. C. HOLY.....*Secretary*
H. G. HULLFISH.....*Publicity*

B. R. BUCKINGHAM
B. H. BODE
H. H. GODDARD
H. G. GOOD
E. E. LEWIS
W. H. STONE

ART
James R. Hopkins, *Ohio State University, Columbus*

BIOLOGICAL SCIENCE
W. A. Matheny, *Ohio University, Athens*

CITY SUPERINTENDENTS
R. G. Jones, *Cleveland*

CLINICAL PSYCHOLOGY
Mabel R. Fernald, *University of Cincinnati*

COMMERCIAL EDUCATION
H. H. Priest, *Columbus*

COUNTY SUPERINTENDENTS
Jerome Hull, *Youngstown*

DEANS OF WOMEN
Esther Allen Gaw, *Ohio State University, Columbus*

EDUCATIONAL AND INTELLIGENCE TESTS
S. L. Pressey, *Ohio State University, Columbus*

ELEMENTARY PRINCIPALS
W. T. Heilman, *Normal School, Columbus*

ELEMENTARY TEACHERS
Ruth M. Griffith, *Miami University, Oxford*

ENGLISH
J. V. Denney, *Ohio State University, Columbus*

GEOGRAPHY
Eugene Van Cleef, *Ohio State University, Columbus*

HIGH-SCHOOL PRINCIPALS' ASSOCIATION
Karl E. Whinnery, *Sandusky*

HISTORY
E. W. Pahlow, *Ohio State University, Columbus*

HOME ECONOMICS
Alice M. Donnelly, *Ohio State University, Columbus*

INDUSTRIAL AND VOCATIONAL EDUCATION
W. H. Stone, *Ohio State University, Columbus*

JOURNALISM
George S. Lasher, *Ohio University, Athens*

JUNIOR HIGH-SCHOOL PRINCIPALS
G. A. Morris, *Dayton*

KINDERGARTEN AND PRIMARY TEACHERS
Mildred Miller, *Cleveland Heights*

LATIN
A. W. Hodgman, *Ohio State University, Columbus*

MATHEMATICS
R. L. Morton, *Ohio University, Athens*

MODERN LANGUAGE
M. B. Evans, *Ohio State University, Columbus*

MUSIC
Royal D. Hughes, *Ohio State University, Columbus*

NON-BIOLOGICAL SCIENCE
Alpheus W. Smith, *Ohio State University, Columbus*

PARENT-TEACHER ASSOCIATION
Mrs. C. E. Kendel, *Lakewood*

PHYSICAL EDUCATION
L. W. St. John, *Ohio State University, Columbus*

RELIGIOUS EDUCATION
C. C. McCracken, *Ohio State University, Columbus*

SCHOOL BUSINESS OFFICIALS
W. G. Reeder, *Ohio State University, Columbus*

SCHOOL LIBRARIANS
Annie S. Cutter, *Cleveland*

SPECIAL EDUCATION
Francis N. Maxfield, *Ohio State University, Columbus*

TEACHER TRAINING
B. H. Bode, *Ohio State University, Columbus*

VILLAGE AND CONSOLIDATED-SCHOOL SUPERINTENDENTS
W. T. Wickam, *Chagrin Falls*

April 12, 13, 14, 1928, at Columbus — *Reserve the dates*

Published fortnightly, except during June, July, and August, with but one issue in December, by the Bureau of Educational Research, Ohio State University.

Entered as Second-Class Matter, February 9, 1922, at the Post-Office at Columbus, Ohio, under the Act of August 24, 1912. Accepted for mailing at specified rates of postage provided for in Section 1103, Act of October 3, 1917, authorized February 21, 1922.

Educational Research Bulletin

A VOCABULARY STUDY OF THE ENGLISH AND METRIC UNITS OF MEASURE USED IN SECONDARY-SCHOOL SCIENCE TEXTBOOKS

OSCAR HIMEBAUGH

Science Department, Central High School, Akron

MORE and more it is being recognized that vocabulary difficulties are important obstacles which prevent pupils from comprehending the meaning of the printed page. If the reader will observe and analyze his own experience, he will find that frequently the lack of understanding of a single word prevents his grasp of the meaning of a sentence, and, in exceptional cases, it may render incomplete the thought conveyed by an entire page or even a chapter. When we remember the importance of concepts in our processes of thinking and of words as symbols for concepts, this point of view will probably need no further emphasis.

The statement just made in reference to the significance of vocabulary difficulties is especially applicable to the more or less technical vocabularies of our high-school textbooks in science. Here the pupil is suddenly faced by a large number of terms, many of which are either entirely new to him or at least very vague in meaning. How large the number of such terms is, is only appreciated by those who have made some detailed study of the situation.

Some previous vocabulary studies.—For the benefit of those who may not be familiar with the previous investigations made in this field, a brief reference is here made to it. The most fundamental work was that of E. L. Thorndike who, in 1921, published the *Teacher's Word Book*.[1] This is a list of the ten thousand words found to occur most frequently in many thousands of pages of reading-matter from forty-one different sources. Mention is made of this study because it was involved, as will be noted, in some of the later and more specific vocabulary studies. The work of Luella C. Pressey, of Ohio State University, followed soon after. She analyzed school textbooks in mathematics, languages, literature, history, civics, and science. The words which were regarded as difficult for children were selected and later rated as to their importance by experienced teachers and students. Nineteen lists of words known as "The Special Vocabularies of the School Subjects" were the printed results of this study.[2] A study of the vocabulary of high-school science textbooks by S. R. Powers, of Teachers College, Columbia University, was made in 1924.[3] The vocabularies listed in his study included only those words not

[1] New York, Teachers College, Columbia University, 1921. vi + 134.

[2] *Nineteen Special Vocabularies of the School Subjects*. Bloomington, Illinois, Public School Publishing Company, 1923. *See also* "The Determination of the Technical Vocabularies of the School Subjects," *School and Society*, 20:91–96, July 19, 1924.

[3] "The Vocabularies of the High-School Science Textbooks," *Teachers College Record*, 26:368–82, January, 1925.

found in the Thorndike list. The same author a little later made a study of the scientific vocabulary in textbooks in high-school science.[1] Here also only words which were not found in Thorndike's list were retained. The list included 7,948 words. In 1926, S. S. Brooks, at Ohio State University, compiled a list of technical and semi-technical terms used in five series of elementary-school arithmetics.[2] The exact nature and results of these studies may be learned by consulting the publications indicated in connection with the foregoing statements relative to them.

The present study.—The vocabulary studies just mentioned were all more or less general, since they were not devoted to a restricted classification. They quite well fulfill the purposes for which they were intended. What are now needed in the interests of education are studies of the more special vocabularies within limited fields. The author has attempted to make a small contribution of this sort in the study reported in this article.

This investigation, briefly stated, is devoted to discovering the extent to which the common English and metric units of measures are used in secondary-school science textbooks. The fact that an understanding of these units is a large factor in the comprehension of the subject-matter in high-school textbooks of science is ample justification for the study. If this view should require any emphasis, it might be recalled that these units are important not only because of the direct meaning which they convey, but also because they are fundamental to the understanding of many of the more technical scientific terms, such as ampere, candle power, latitude, and calorie.

The method used in the investigation was carefully to analyze standard textbooks and tabulate, first, the total number of times—frequency—each unit was used; and, second, the total number of pages—distribution—on which it occurred. In this manner, five textbooks were analyzed in each of the five sciences, general science, physical geography, biology, physics, and chemistry. Totals were found for both the frequency and the distribution for each textbook, for each subject, and for the twenty-five books covering the five subjects. The units were then ranked as to frequency and as to distribution for each subject and for the five subjects combined.[3]

Results of the study.—Table I shows the distribution by pages of those units which occur on a total of ten or more pages of the twenty-five textbooks in the five sciences. It also shows the same data for the five books in each science. The figures showing the distribution are offered here instead of those showing the frequency, because it is considered that the distribution of use is of greater significance for teaching purposes than the frequency of use. A unit, for example, may be used twenty-five times on a single page and perhaps not be found again in the entire book. On the other hand, it may be met frequently throughout the book. The latter situation is assumed to indicate greater importance of the unit—to the pupil—than the former. This view, of course, is arbitrary and open to question. However, when the two rankings (according to frequency and according to distribution) are compared it is found that there is a general agreement in the relative position of the units—that is, units that rank high in one list rank high in the other and vice versa.

[1] "A Vocabulary of Scientific Terms for High-School Students," *Teachers College Record*, 28:220–45, November, 1926.

[2] "A Study of the Technical and Semi-Technical Vocabularies of Arithmetic," *Educational Research Bulletin*, 5:219–22, May 26, 1926.

[3] "The Use of the Common English and Metric Units of Measure in Secondary School Science Textbooks." An unpublished Master's thesis, by the author, gives a complete account of the results of the study. It is on file in the library of Ohio State University.

TABLE I

DISTRIBUTION OF ENGLISH AND METRIC UNITS OF MEASURE IN SECONDARY-SCHOOL SCIENCE TEXTBOOKS

NAMES OF UNITS*	DISTRIBUTION BY PAGES					TOTAL
	General Science	Physical Geography	Biology	Physics	Chemistry	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
English Units:						
Year	466	473	383	226	172	1,720
Foot	214	458	72	457	51	1,252
Mile	216	470	28	128	13	855
Percent	122	97	108	102	326	735
Inch	192	198	67	235	31	723
Pound (avoirdupois)	136	59	30	360	106	711
Day	238	191	113	22	25	609
Hour	171	132	64	120	28	515
Degree (angular)	48	292	4	80	.....	424
Month	122	188	74	15	6	405
Second (time)	60	13	12	286	9	380
Minute (time)	127	52	41	80	18	318
Dollar	44	101	83	21	27	276
Ton (common)	41	53	12	69	71	246
Cubic foot	35	14	1	94	38	182
Square inch	41	18	3	83	14	159
Square mile	5	85	5	1	2	98
Cent	24	28	7	22	10	91
Week	40	14	32	2	1	89
Ounce (avoirdupois)	19	.....	22	21	25	87
Gallon	30	6	8	26	13	83
Acre	18	39	21	.....	4	82
Century	42	20	15	3	2	82
Square foot	12	11	2	16	1	42
Minute (angular)	6	33	.....	3	.....	42
Yard	10	6	1	20	4	41
Quart (liquid)	15	.....	9	3	3	32
Bushel	3	15	9	.....	3	30
Cubic inch	6	2	3	11	8	30
Pint	18	.....	7	1	2	28
Fathom	.....	21	.....	.....	.....	21
Grain	6	3	2	7	1	19
Barrel (liquid)	1	9	1	.....	5	16
Second (angular)	3	11	.....	.....	.....	14
Quart (dry)	6	.....	.....	6	.....	12
Cubic mile	.....	10	.....	.....	.....	10
Metric Units:						
Gram	39	1	10	257	209	516
Centimeter	16	2	8	225	11	262
Cubic centimeter	20	3	11	91	86	211
Liter	2	.....	.....	32	115	149
Millimeter	3	5	3	83	52	146
Meter	15	2	.....	87	1	105
Kilogram	3	.....	.....	63	24	90
Square centimeter	.....	.....	.....	31	3	34
Kilometer	1	2	.....	24	.....	27
Cubic meter	3	.....	.....	15	2	20
Milligram	.....	.....	.....	9	5	14
Metric ton	.....	.....	4	6	.....	10

* Thirty-four terms, such as carat (in jewelry), board foot, knot, dozen, and the like, appeared on less than ten pages of the twenty-five books. These taken together made a total of 82.

The author wishes to point out that while much care was exercised in the study, minor errors no doubt occur in the figures. The chances for errors may be realized when it is known that the total frequency in the study amounted to 48,943, the total distribution to 12,158 and that 14,081 pages of text were analyzed.

Significance of the data.—What modifications in educational practice relative to the teaching of units of measure do these data suggest? The author's present purpose is not to attempt to solve this problem, but simply to furnish some specific information which may be useful as a basis for its solution. The results indicate quite clearly what the high-school pupil must face on this score as he enters upon the study of the sciences in the course of study. Many interesting facts might be pointed out relative to the distribution of these units, and statements could be made as to the policies which these facts suggest for the teachers of elementary-school arithmetic and of high-school science: but such a digression would take us far beyond the scope and purpose of this article.

ACCOMPLISHMENTS OF THE CHILD-HEALTH DEMONSTRATION OF MANSFIELD AND RICHLAND COUNTY, OHIO

GLENN D. ROHLEDER
Mansfield, Ohio

HERBERT HOOVER, president of the American Child Health Association, which organization supervised the Child-Health Demonstration of the city of Mansfield and of Richland County, Ohio, formulated what he has called the "child's bill of rights" which was widely used in connection with the observance of child-health day this year. His statement was:

> The ideal to which we should strive is that there shall be no child in America who has not been born under proper conditions, who does not live in hygienic surroundings, who ever suffers from under-nutrition, who does not have prompt and efficient medical attention and inspection, and who does not receive primary instruction in the elements of hygiene and good health; that there shall be no child who has not the complete birthright of a sound mind in a sound body and the encouragement to express in fullest measure the spirit within, which is the final endowment of every human being.

The "bill of rights" embodies an ideal such as that which originated and stimulated the health demonstration in Mansfield and Richland County. This article purposes to give some of the results of that demonstration which has grown from a one-day festival to a year-round program of child-health work.

Health-education work.—The objectives of a broad program in health education were set up by the health-education service for the rural and city schools. These were as follows:

1. To develop favorable attitudes toward the practice of good health habits.
2. To secure the cooperation of the child in all measures which tend to help children reach the maximum of physical, mental, and social fitness.
3. To increase continually general knowledge on health subjects which will guide the child's actions.
4. To surround the child with such environment and practices as are examples of the highest health principles.

The original plans of the demonstration involved no set course of study in health education. The school-health education service soon received requests, however, from both city and county

educational units for the development of detailed plans to be used by the classroom teacher.

A survey was made in order to determine the outstanding health needs of the children in the primary, intermediate, and grammar grades and the common need in all grades. The results of the survey were summarized and used as bases in formulating specific aims for the different groups.

A tentative program of topics and activities necessary to accomplish the objectives was outlined for each grade. Topical outlines were prepared on the many subjects relevant to health education. The large number of topics, however, made it impossible for the health-education director to give assistance to teachers when they needed it. To overcome this, a program of special monthly health topics was used in all the schools of the county. In this way, a health-education teaching program was developed which was practical and workable.

The director prepared such educational material as the monthly outlines on health topics, a survey of textbook materials for correlations with health, and a traveling exhibit showing children's work in health. This material was used for extending the idea of school-health teaching in other parts of Ohio. It was exhibited extensively at institutes for city and county teachers.

A number of features were incorporated in the health-education program. These included monthly weighings of children with measuring in September and February, daily morning inspection for cleanliness and beginning signs of contagion or illness, daily attention to sanitation of schoolrooms and school buildings, the keeping of individual health-record cards by the school nurse, and the awarding of a trophy cup to the school which made the most progress in health teaching and received the highest score.

School-health examinations.—Because the laws of Ohio do not permit the medical examination of school children without the consent of their parents, advance notices of examinations were sent to parents. With each notice went a consent card to be signed and returned and an invitation to attend the examination. This plan was followed with good results in 1922, 1923, and 1924. In 1925, more consents were received with less persuasion than in any previous year, and many schools had 100 percent returns.

Examinations were conducted in the local school buildings with the active cooperation of the medical and dental professions and the parent-teacher associations. Volunteers were appointed by the parent-teacher associations of the various buildings to do the clerical work. The school teachers, and sometimes the volunteers, did the weighing and measuring; the nurses made the routine examination of sight, hearing, and posture; and various members of the medical and dental societies who had volunteered their services made the dental and medical examinations. Careful examinations were made for all defects listed on the physical-record card.

The number of children in the entire county receiving a complete physician's examination increased from 720 in 1921-22 to 4,919 in 1924-25. This showed an increase from 8 percent to 61 percent of the total school population. The entire school population receiving dental examinations increased from 12 percent to 70 percent; and the nurses' inspections for defective speech, hearing, and vision increased from 13 percent to 69 percent in the same period.

The 1924-25 school examinations revealed that, in the Mansfield schools, 87 percent of those examined had defects needing medical or dental care. In the village schools 92 percent of the children needed medical or dental care, and in the rural schools, 85 percent.

Physicians, nurses, and teachers explained to the parents the findings of the examinations and urged correction of the defects. A nurses' survey made for 1922 through the first semester of 1925 showed that, in the entire county, 2,817 school children, or 57 percent of the 4,961 children for whom health records were available, had had one or more defects corrected. Another survey covering corrections made from the beginning of February, 1925, to the end of the school year revealed that 1,416, or 32 percent of the children who were found, in the last school examination, to have defects, had had one or more of these corrected.

The blue-ribbon project.—No doubt the most notable achievement of the demonstration was the completeness and thoroughness with which the different services for child health were combined in a united program. A parade of nearly thirty-seven hundred blue-ribbon children to celebrate the achievements of the demonstration symbolized this unity of purpose. On Child-Health Day, May 1, 1926, Governor A. Victor Donahey and his staff; the State Director of Health, Dr. John R. Monger; visitors from outside of the State; and nearly thirty-five thousand residents of the county paid homage to the children as they paraded through the streets of Mansfield wearing blue-ribbon badges on which appeared the legend, "First Premium for Health."

The standards for a blue-ribbon award developed gradually. A standard was finally formulated by which a child is judged eligible for a blue ribbon. According to that regulation, he must be mentally normal, free from physical defects, reasonably cooperative in the practice of health habits, and satisfactory in his behavior and attitude in the school environment. These requirements are explained in detail on printed sheets used by the physicians, nurses, and teachers.

Each child who has been awarded a blue ribbon is entitled to register in the Blue-Ribbon Book. This is in the form of a loose-leaf ledger and is now kept in the library of the health department. There is space on each page for six children to sign their names and to paste in small photographs of themselves. A card is also made out which gives for each ribbon-holder his name, age, sex, color, school, nurse, teacher, and date of the award. This is filed and becomes a part of the permanent health-program records.

"Mansfield, the home of blue-ribbon children," has become the city slogan, advertised by the Chamber of Commerce, the Board of Health, the press, and individual citizens. By popular accord an annual Blue-Ribbon Health Day has become a local institution, and the blue-ribbon children have become the county's chief pride.

School-lunch service.—One of the most interesting projects under the nutrition service of the demonstration was the school-lunch service of which there were three types—city-school lunches, village-school lunches, and rural lunches. Mansfield High School opened a cafeteria which was placed in charge of the nutrition director of the demonstration. She planned the menus, ordered the foods, kept accounts, and instructed the cooks. Five cents was the cost of each serving, and the portions were generous. The cafeteria was so successful that four hundred dollars' worth of equipment was paid for, and the first year closed with a profit of three hundred dollars. The next year new equipment was bought and the patronage increased. The cafeteria is now a permanent service in the school.

At the Newman School in Mansfield a daily lunch service was begun on November 14, 1923, for more than one hundred children. A three-dish lunch, with as great a variety of foods as possible, was served for eight cents, and

a half-pint bottle of milk was three cents extra. This charge was just enough to cover the cost of the food. During the first year the cafeteria was managed entirely by the nutrition director, since then it has been managed by one of the teachers. From November, 1923, until the close of the school year, almost thirteen thousand lunches were served and the year closed with a balance of more than thirty dollars.

In the spring of 1924 a survey was made at the Newman School to discover those children who could not afford the nominal charge of eight cents. These children were given their lunches free.

Cots and blankets were also provided in the school auditorium for the forty underweight children who stayed for lunch. After lunch they rested for a half-hour on these cots. These children were weighed every two weeks, special weight charts kept for them, and special instructions in health habits given them.

In connection with the nutrition project at Newman School, an interesting feature was the feeding of two white rats. The one was given food containing little nutriment, while the other one was fed from the cafeteria food. Each rat was weighed regularly, had its own weight chart, and the weight curve was plotted. This demonstration helped to impress upon the pupils the right kind of foods to eat.

Milk service.—Before the demonstration opened, a milk service was furnished to the children of the first grades in Mansfield by the Federation of Women's Clubs. With the coming of the nutrition director, she was made supervisor of the project, working in cooperation with the Federation. In the fall of 1922, this service was extended to children in all grades. All were urged to pay for it, but those who were 10 percent or more underweight and who could not pay for it, received the milk free. The Community Chest provided the funds with which to purchase this milk.

Fresh-air camps.—A fresh-air camp has been held in Mansfield each summer since 1923. The camp is supported from funds raised in Richland County by the sale of Christmas seals under the auspices of the Ohio Public Health Association. Fees are collected from those children whose parents can afford to contribute toward their maintenance. The director of nursing of the demonstration was in charge of the camp from the first, and the directors of medical service, nutrition, health education, and research gave cordial cooperation. The camp was established for those children in Richland County who needed special care either because of previous illness, because of a general run-down or underweight condition, or because they had been exposed to tuberculosis.

Seventeen of the thirty-three children enrolled left the 1925 camp above standard weight; ten were awarded blue ribbons; and there was an average gain of 6.9 pounds per child. The expenditure for the 1925 camp was $2,961.

Health centers.—The demonstration's supervision of infants and pre-school children was conducted through the health centers with follow-up home visits by staff nurses. A local committee was charged with equipping the main health center in Mansfield which was opened in the demonstration headquarters. Throughout the period of the demonstration four city and eight rural centers were established. All the centers were well attended. A total of 2,745 individual children attended the regular centers, making a total of 8,554 visits. In addition, 569 children attended temporary centers in 1923 and 636 in 1924.

Hospital clinics.—As a result of the activities of the demonstration, there became apparent the need for a hospital clinic in Mansfield to serve indigent children. Since the policy of the demonstration was to confine itself to prevention work, the Richland County Medical Society and the Mansfield

General Hospital were requested to establish such a clinic. This they did, furnishing equipment and medical and surgical service. Up to November, 1925, a total of 328 patients had made 767 visits to it and 138 operations had been performed.

Communicable-disease control.—In the effort to control all communicable diseases in the schools, the demonstration staff cooperated with the local boards of health, the state health department, and the school systems.

In the prevention and control of diphtheria, in December, 1923, Schick tests were given to 1,439 Mansfield school children—about one-third of the total enrollment. In the fall of 1925, the Schick test and toxin-antitoxin were offered to all children in the rural schools. A total of 1,377 Schick tests were given in the rural and village schools, and 1,161 children, almost one-third of the total enrollment, who gave positive reactions, were given toxin-antitoxin.

In the fall of 1925, a total of 2,015 children, almost half of the total school enrollment in Mansfield, were given the Dick test to determine their susceptibility to scarlet fever. Of these, 1,350 gave a positive reaction.

When three cases of smallpox appeared in Mansfield in the spring of 1925, the demonstration and the Board of Health launched an active campaign for general vaccination. Within a period of about six weeks, more than 80 percent of the children in the city schools were vaccinated with practically no opposition from any source. This achievement seemed the more noteworthy in view of Mansfield's former position as the center of active anti-vaccination propaganda.

Demonstration visitors.—The Child-Health Demonstration at Mansfield became not only nationally but internationally known. It was visited by those interested in child-health education from all parts of the United States and foreign lands. An interesting exhibit in the demonstration library is the Guest Book. It contains the names of such visitors as the Chief of Health Service of Austria; the Medical Inspector of the Irish Free State; the Inspector of Public Health of Bulgaria; the Chief of the Department of Sanitation at Colombo, Ceylon; the Professor of Hygiene and Bacteriology in the University of Uppsala, Sweden; and scores of other department heads, as well as nurses and doctors from Poland, Czechoslovakia, Trinidad, China, England, France, Canada, and other countries.

Future status of public-health program.—The demonstration, as such, discontinued its public-health activities on January 1, 1926. Its work was officially transferred to the Mansfield and Richland County boards of health and to the Mansfield Public Health Nursing Association. All of the activities sponsored by the demonstration, with the exception of research, are being continued by those organizations, and there is every indication that the standards set by the demonstration as to the type and character of work will be maintained.

COLLEGE FOREIGN LANGUAGE STUDENTS ADVANCE TWICE AS FAST AS THOSE IN HIGH SCHOOL

The norms given for Forms A and B, of the Contreras-Broom-Kaulfers Spanish Silent Reading Test reviewed in an earlier issue are given in Table I.

School principals, psychologists, and educationists in general should find in these norms food for serious thought. This is especially true of those who have maintained it would be wise to force elementary foreign languages out of the college and down into the high school and grades as being the place where they could be most economically learned. Likewise, of those who have been insisting on giving such transferred high-school credit equal rank with that obtained in college.

As will be noted, the norms for both tests indicate that the college student by the end of the second semester is as far advanced as the high-school student at the end of his fourth semester. The figures are based upon a somewhat limited number of papers, but in reviewing these tests, the writer was struck with the general agreement shown between them and the same facts found in an administration of more than eighty thousand which he carried out for a recent national survey. For these he used a battery of tests designed to indicate the whole gamut of a student's linguistic ability and that without any reference to his native language or the involvement of other abilities. They covered not only a reading test and active vocabulary but a test of pronunciation, grammar, understanding spoken Spanish, passive reading vocabulary, and composition. Such results would seem to confirm Jespersen and a number of recent investigators all of whom tend to justify the stand taken by college language teachers generally on both of these questions.

TABLE I

NORMS GIVEN FOR THE CONTRERAS-BROOM-KAULFERS SILENT-READING AND VOCABULARY TESTS IN SPANISH

SEMESTERS OF STUDY	SILENT-READING TEST		VOCABULARY TEST	
	Boys	Girls	Boys	Girls
(1)	(2)	(3)	(4)	(5)
In High School:				
1	9.46	9.21	33.5	40.1
2	12.71	13.50	44.8	46.1
3	14.37	14.96	57.1	57.3
4	16.30	15.64	55.9	62.5
5	16.50	16.80	63.1	63.0
6	18.50	16.12	65.3	64.7
7	18.00	16.95	....	....
8	20.00	20.00	....	....
In College:				
1	11.13	14.40	50.0	46.1
2	14.50	16.67	63.8	61.2

High-school norms—6,000 test papers.
College norms—4,000 test papers.

G. O. RUSSELL
Ohio State University

ORGANIZED RESEARCH IN EDUCATION

With Special Reference to the Bureau of Educational Research

By

H. B. CHAPMAN

BUREAU OF EDUCATIONAL RESEARCH MONOGRAPHS, No. 7

Ohio State University Press *Price, $1.50*

Ohio State University

Educational Research Bulletin

Published fortnightly, except during June, July, and August, with but one issue in December, for the schools of Ohio by the Bureau of Educational Research, College of Education, The Ohio State University, Columbus.

B. R. BUCKINGHAM . . . . *Editor*
JOSEPHINE MACLATCHY . *Assistant Editor*

Address all communications to the
BUREAU OF EDUCATIONAL RESEARCH
Ohio State University, Columbus, Ohio

A STUDENT SPEAKS

IN a recent issue of this Bulletin the Editor turned professor and students aspiring to attain advance degrees by ways of research passed in review before the reader. There was the student without a problem, the student with too small a problem, the student with too general a problem, and the ideal student with a satisfactory problem. The cockles of many professorial hearts have been warmed by this appraisal of the graduate student. The student's case has, as yet, been unstated, so a worm turns and a "printer's devil" attempts the rôle of student. Many sorts of professors are known to graduate students. Their classification, in terms of one's problem, is rather difficult.

First, there is the disdainful professor. His chief weapon is sarcasm, not the humorous sort to which the victim with a sense of humor must subscribe, but the withering blast which leaves him questioning his belief in the survival of the fittest. To this sort of professor any problem suggested by a student is likely to be worthless. To this class belonged the professor who, when he learned upon inquiry that a certain student had made an excellent mark in a difficult course, remarked, "You were told you received that mark? Well, there must have been a mistake in the Registrar's office."

Then there is the destructive professor. No way is right but his way. High marks are gained by giving him back just what he gave. The nearer the reproduction resembles the original the more creditable the performance. This professor is inclined to destroy with the battery of his criticism the intellectual constructs of others, but he gives nothing in his turn. The graduate student who works out a problem with such a professor works alone and unaided. His supervisor's chief delight is periodically to demolish the work as far as the student has gone. His criticisms are not constructive. He discredits the efforts of the student just as he criticizes the work of his intellectual contemporaries. But commencement day comes on apace, and the upshot of the student's labor is the belated acceptance of a slipshod piece of work.

The benign professor errs in the other extreme. His mercy tempers justice until, in his care of the fine feelings and ambitions of the student, he sometimes overlooks weaknesses which should be corrected and errors which should be eradicated. The lack of iron in his blood frequently loses for him the respect and affection which he really deserves. The careful student does his best work for such a professor, but the graduate student who is maintaining his undergraduate delight in "getting by" generally misses the best that the benign professor has to offer.

The graduate student's dream is to work out his major courses with the scholarly professor. Sometimes this professor is more interested in his research or his scholarly pursuits than he is in the students who aspire to receive his tuition. Conference and seminar are unwelcome interruptions to the study which to him is "closer than breathing." From this avid scholar the earnest student learns by incident and example; and he must be willing to undergo any servitude that may be imposed if he is to

acquire even a shadow of his master's method or knowledge.

The fortunate graduate student studies with the professor who loves his work, knows its method, appreciates its problems, and recognizes that his greatest gift to society may be made by proxy through his intellectual progeny. Such a professor need be no less a savant than his scholarly colleague, but his love of learning is broader than his span of effort. He knows that in the expanse of his beloved subject his researches must be few and limited, but through his students he may pass on what he has learned and inspire ambition to push the bounds of learning wider yet. The productivity of such a professor is not measured by the books he has written, but by the students he has trained. America's debt to Wundt is not expressed in the entries opposite his name in the card catalogues of university libraries but by the contributions of Judd, Hall, Arps, Cattell, and Titchener.

J. H. M.

ARKANSAS SPEEDS UP

THE slow train through Arkansas has picked up speed amazingly during the past few years, and it now behooves the cow to stay off the tracks. Last year the state department of education issued a series of sixteen bulletins on education that are little less than marvels as publicity material.[1] From the striking title on the cover to the very last page, each one is packed with pertinent facts concerning the schools. The facts are put up in such an interesting way that they not only do not tire the reader but they stick, and certainly if one were a citizen of the State, he would be determined to do something about it.

We cannot begin to give the series the space that it deserves, but perhaps we can impart a little of the flavor. In "From the Beginning," there is a section on "striking likenesses." At the top of one of the pages is a picture of a little old log hut, "Mountain Spring School House, 1880." Just below is a picture of "Mountain Spring School House, 1925," and it's the same old log hut. Other likenesses are given in type, such as bases of apportionment of funds and standards for teachers.

"A Place to Work—a Place to Play" deals with buildings and grounds; "Opportunity Knocks Again" has to do with vocational rehabilitation; "A High School in Reach of Every Boy and Girl" speaks for itself; as do also "Vocational Agriculture and Home Economics" and "Financial Support of Education in Arkansas." "From Six to Twenty-one" is devoted to child accounting; "Outside the City Limits" discusses educational equalization; and "Me Too" presents the problems of negro education. Bulletin No. 16 is a summary statement of the materials presented in the other fifteen bulletins.

It is a remarkable series of bulletins, and—in the salesman's lingo—"They must be seen to be appreciated." Surely they cannot fail to exert a profound influence on the educational future of the state, especially with the follow-up that the state department of education will give. A department that sees the faults described in these bulletins and then puts them before the people, will just naturally work doubly hard to improve conditions. Other states may well take a leaf from the Arkansas book of publicity and use it as a guide in presenting their own educational conditions.

J. A. B.

A WELL-WRITTEN report is that on the state institutions of higher learning in Indiana.[2] There are twelve chapters, each

[1] *Four Years with the Public Schools in Arkansas, 1923–27.* Little Rock, Arkansas, State Department of Education, 1927.

[2] Judd, Charles H., and others. *Report of a Survey of the State Institutions of Higher Learning in Indiana.* Indianapolis, Board of Public Printing, 1926. 206 pp.

dealing with an important phase of the survey. The conclusions are stated in a clear, concise, interesting, and convincing manner and an excellent index is provided.

Some of the findings are: Indiana has 10.8 percent of the population and slightly less than 10 percent of the wealth and income of seven neighboring North Central States. On the basis of population, wealth, and income, the Survey Commission avers that "it appears reasonable to assume that the funds which should be given for the support of education in Indiana should constitute approximately 10 percent of the combined funds given for the support of education in the seven North Central States constituting a group of which Indiana is typical." On the 10 percent standard, the state is supporting elementary and secondary education "in a very generous manner," expending 12 percent of the total taxes paid by these seven states for these levels of education. But, in the support of universities and normal schools, Indiana is doing only about three-fourths as much as would be necessary to provide 10 percent of the total for the seven states.

Additional evidence indicating that Indiana should more adequately support her higher educational institutions is offered. Among such evidence, we find that 46.5 percent of the state's high-school graduates continue their education; this is 4.5 percent above the average for the seven North Central States. Furthermore, "the percent of high-school graduates over a four-year period attending higher institutions in the State is much lower (14 percent) for Indiana than for the North Central States." This would indicate a relatively high student migration to institutions in other states. It would appear, then, from the standpoint of both economic ability and need, that Indiana must give more support to her institutions of higher learning if she is to keep pace with neighboring states or hold her own high-school graduates within her borders.

Two other facts of especial interest which are revealed by the survey are: (1) "The 42 counties of the State lying south of the old National Road, having approximately one-fourth of the taxable wealth of the state, and one-fourth of its population, produce approximately one-half of the state's elementary teachers." This agrees with the findings of several other studies, showing that rural sections furnish a disproportionate share of elementary teachers. (2) The average percent of faculty turnover at the two state universities of Indiana for the five-year period from 1921-22 to 1925-26, inclusive, was about 11 percent. This point is well illustrated by the turnover in the personnel of the School of Education. In this connection, the investigators state that "During the past four years approximately one-third of the faculty and clerical staff has resigned each year." This is certainly a crucial problem. The reader may sense a reason for this situation in the statement that "The Indiana institutions must be prepared to pay a number of very high salaries if they are to keep their best men."

J. L. L.

Huron County has the distinction of having the only county-visiting teacher. The following are among the duties which this teacher, Miss Elizabeth Alling, performs: checks the scholarship of pupils; makes home surveys; gives physical examinations; aids in securing a proper adjustment of the child to the school; arouses the interest of teachers in backward pupils; and aids inexperienced teachers in handling school and social problems. We believe this activity is worth while and that other counties should consider incorporating it in their educational programs.

A TABLE TO FACILITATE THE CALCULATION OF THE PROBABLE ERROR OF THE MEAN

HAROLD A. EDGERTON
and
HERBERT A. TOOPS
Ohio State University

IN EDUCATIONAL, social, and psychological investigations, conclusions have often been based on unreliable averages or means. The table given in this article is intended to facilitate the computation of one such measure of unreliability, the probable error of the mean.

The probable error of the mean is a measure of the unreliability of the mean, and it will be large when too few cases are used. If the mean should be recomputed on a second group of the same size, the second mean would not ordinarily coincide with the mean first obtained. Knowing the probable error of the mean we can express the likelihood (probability) that the second mean will fall, upon repetition of the experiment, within any desired designated limits, as shown by the figures given later in this paragraph. For other limits than these, one should consult a table of integrals of the normal surface of frequency based on probable errors.[1] If the mean were to be recomputed on 100 successive groups of persons of which the original group is a typical sampling, the variability of these new means about their average, or true mean, may be inferred from the following statements: Out of every 100 repetitions of the determination of the mean the expectation is that 50 of the means[2] will fall within the range $(M_1 - 1\ PE)$ to $(M_1 + 1\ PE)$; 82, within the range $(M_1 - 2\ PE)$ to $(M_1 + 2\ PE)$; 96, within the range $(M_1 - 3\ PE)$ to $(M_1 + 3\ PE)$; and 99, within the range $(M_1 - 4\ PE)$ to $(M_1 + 4\ PE)$.

Thus, if in a certain distribution, the mean equals 10 and the probable error of the mean equals 2, the chances are 1 to 1 that the true mean, the average of an infinite number of repetitions of the determination of the mean, will lie within two points of 10; namely that the true mean will lie between 8 and 12. Or stated differently, the chances are 1 out of 2 that the true mean will lie between 8 and 12; or, in half (50 percent) of the repetitions of the experiment we may expect the obtained means to lie between 8 and 12.

If in the example just given, probable error of the mean equals 4 instead of 2, (which may come about, among other things, by reason of having too few cases) then in half the cases of the repetition of the experiment we should expect the obtained means to lie within the range of scores 6 to 14. The probable error of the mean is also an essential component in the computation of the probable error of the difference of the means by the usual formula. The value of the probable error of the difference of the means is essential to any correct reasoning about the significance of sex and social differences, the results of controlled experimentation, the efficiency of different methods of teaching, industrial methods, and the like.

THE DERIVATION OF THE TABLE

The probable error of the mean is found by the formula,

$$PE_m = \frac{.6744898 \cdot \sigma}{\sqrt{N}} \quad \ldots\ldots\ldots\ldots (1)$$

[1] Thorndike, E. L. *Mental and Social Measurements.* New York, Teachers College, Columbia University, 1916. p. 220. Table 52. Also, Rugg, H. A., *Statistical Methods Applied to Education.* New York, Houghton Mifflin Company, 1917. p. 231.

[2] M_1 is the mean found the first time the experiment is conducted.

TABLE I

A TABLE TO FACILITATE THE CALCULATION OF THE PROBABLE ERROR OF THE MEAN

K	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	K
.0099	4688	1154	510	286	183	127	93	.....	.....	.....	.0099
.0098	4785	1166	514	287	.....	.....	.....	.....	.....	.....	.0098
.0097	4885	1178	517	289	184	.....	.....	.....	.....	.....	.0097
.0096	4988	1190	520	290	185	128	94	.....	.....	.....	.0096
.0095	5094	1202	524	292	186	.....	.....	72	.....	.....	.0095
.0094	5203	1215	528	293	.....	129	.....	.....	.....	46	.0094
.0093	5317	1227	531	295	187	.....	.....	.....	.....	.....	.0093
.0092	5433	1240	535	296	188	130	95	.....	57	.....	.0092
.0091	5554	1253	539	298	189	.....	.....	.....	.....	.....	.0091
.0090	5679	1266	542	299	.....	.....	.....	.....	.....	.....	.0090
.0089	5808	1280	546	301	190	131	.....	73	.....	.....	.0089
.0088	5942	1294	550	302	191	.....	96	.....	.....	.....	.0088
.0087	6080	1307	554	304	192	132	.....	.....	.....	.....	.0087
.0086	6223	1322	558	306	193	.....	.....	.....	58	.....	.0086
.0085	6371	1336	562	307	.....	133	97	.....	.....	.....	.0085
.0084	6524	1351	566	309	194	.....	.....	74	.....	47	.0084
.0083	6684	1365	570	310	195	134	.....	.....	.....	.....	.0083
.0082	6849	1381	574	312	196	.....	.....	.....	.....	.....	.0082
.0081	7020	1396	578	314	197	135	98	.....	.....	.....	.0081
.0080	7198	1411	582	315	.....	.....	.....	.....	.....	.....	.0080
.0079	7382	1427	586	317	198	.....	.....	75	.....	.....	.0079
.0078	7574	1443	590	319	199	136	99	.....	59	.....	.0078
.0077	7773	1460	593	320	200	.....	.....	.....	.....	.....	.0077
.0076	7980	1477	599	322	201	137	.....	.....	.....	.....	.0076
.0075	8196	1494	603	324	202	.....	.....	.....	.....	.....	.0075
.0074	8421	1511	608	326	.....	138	100	76	.....	48	.0074
.0073	8655	1528	612	327	203	.....	.....	.....	.....	.....	.0073
.0072	8998	1546	617	329	204	139	.....	.....	.....	.....	.0072
.0071	9153	1564	621	331	205	.....	101	.....	60	.....	.0071
.0070	9418	1583	626	333	206	140	.....	.....	.....	.....	.0070
.0069	9695	1602	631	335	207	.....	.....	77	.....	.....	.0069
.0068	9984	1621	635	336	208	141	102	.....	.....	.....	.0068
.0067	10287	1641	640	338	209	.....	.....	.....	.....	.....	.0067
.0066	10603	1660	645	340	.....	142	.....	.....	.....	.....	.0066
.0065	10935	1681	650	342	210	.....	103	.....	.....	.....	.0065
.0064	11282	1701	655	344	211	143	.....	78	61	49	.0064
.0063	11646	1722	660	346	212	.....	.....	.....	.....	.....	.0063
.0062	12028	1744	665	348	213	144	.....	.....	.....	.....	.0062
.0061	12429	1766	670	350	214	.....	104	.....	.....	.....	.0061
.0060	12850	1788	675	352	215	145	.....	.....	.....	.....	.0060
.0059	13293	1810	680	353	216	.....	.....	79	.....	.....	.0059
.0058	13759	1833	686	355	217	146	105	.....	.....	.....	.0058
.0057	14251	1856	691	357	218	.....	.....	.....	62	.....	.0057
.0056	14769	1881	696	359	219	147	.....	.....	.....	.....	.0056
.0055	15316	1905	702	362	220	.....	106	.....	.....	.....	.0055
.0054	15894	1930	707	364	221	148	.....	80	.....	50	.0054
.0053	16505	1956	713	366	222	149	.....	.....	.....	.....	.0053
.0052	17152	1982	719	368	223	.....	107	.....	.....	.....	.0052
.0051	17838	2008	724	370	224	150	.....	.....	.....	.....	.0051
.0050	18566	2035	730	372	225	.....	.....	.....	63	.....	.0050
.0049	19340	2062	736	374	226	151	108	81	.....	.....	.0049
.0048	20163	2091	742	376	227	.....	.....	.....	.....	.....	.0048
.0047	21039	2119	748	378	228	152	.....	.....	.....	.....	.0047
.0046	21974	2148	754	381	229	.....	109	.....	.....	.....	.0046
.0045	22973	2178	761	383	230	153	.....	82	.....	.....	.0045
.0044	24042	2209	767	385	231	154	.....	.....	.....	51	.0044
.0043	25186	2240	773	387	232	.....	110	.....	64	.....	.0043
.0042	26415	2272	780	390	233	155	.....	.....	.....	.....	.0042
.0041	27735	2304	786	392	234	.....	.....	.....	.....	.....	.0041
.0040	29157	2337	793	394	235	156	111	83	.....	.....	.0040
.0039	30692	2371	799	397	236	.....	.....	.....	.....	.....	.0039
.0038	32351	2406	806	399	237	157	.....	.....	.....	.....	.0038
.0037	34147	2441	813	401	238	158	112	.....	65	.....	.0037
.0036	36098	2477	820	404	239	.....	.....	84	.....	.....	.0036
.0035	38221	2514	827	406	240	159	113	.....	.....	52	.0035
.0034	40537	2552	834	409	242	.....	.....	.....	.....	.....	.0034
.0033	43070	2591	841	411	243	160	.....	.....	.....	.....	.0033
.0032	45848	2630	848	413	244	161	114	85	.....	.....	.0032
.0031	48904	2671	856	416	245	.....	.....	.....	.....	.....	.0031
.0030	52276	2712	863	419	246	162	.....	.....	66	.....	.0030
.0029	56009	2755	871	421	247	.....	115	.....	.....	.....	.0029
.0028	60156	2798	878	424	248	163	.....	.....	.....	.....	.0028
K	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	K

TABLE I—*Continued*

K	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	K
.0027	64782	2842	886	426	250	164	.....	86	.....	.....	.0027
.0026	69963	2888	894	429	251	.....	116	.....	.....	53	.0026
.0025	75791	2935	902	432	252	165	.....	.....	.....	.....	.0025
.0024	82378	2982	910	434	253	166	117	.....	67	.....	.0024
.0023	89863	3031	918	437	254	.....	.....	87	.....	.....	.0023
.0022	98417	3081	927	440	256	167	.....	.....	.....	.....	.0022
.0021	108253	3133	935	442	257	.....	118	.....	.....	.....	.0021
.0020	119641	3185	944	445	258	168	.....	.....	.....	.....	.0020
.0019	132925	3239	952	448	259	169	.....	88	.....	.....	.0019
.0018	148330	3295	961	451	260	.....	119	.....	68	54	.0018
.0017	167102	3351	970	454	262	170	.....	.....	.....	.....	.0017
.0016	189359	3410	979	457	263	171	120	.....	.....	.....	.0016
.0015	216378	3470	988	459	264	.....	.....	89	.....	.....	.0015
.0014	249622	3531	998	462	266	172	.....	.....	.....	.....	.0014
.0013	291159	3594	1007	465	267	173	121	.....	.....	.....	.0013
.0012	343997	3659	1017	468	268	.....	.....	.....	69	.....	.0012
.0011	412640	3725	1026	471	269	174	122	90	.....	.....	.0011
.0010	504084	3794	1036	474	271	175	.....	.....	.....	.....	.0010
.0009	629669	3864	1046	478	272	.....	.....	.....	.....	55	.0009
.0008	808775	3936	1056	481	273	176	123	.....	.....	.....	.0008
.0007	1076772	4010	1066	484	275	177	.....	91	.....	.....	.0007
.0006	1503922	4087	1077	487	276	178	124	.....	70	.....	.0006
.0005	2246599	4165	1087	490	278	.....	.....	.....	.....	.....	.0005
.0004	3713767	4246	1098	493	279	179	.....	.....	.....	.....	.0004
.0003	7278983	4330	1109	497	280	180	125	92	.....	.....	.0003
.0002	20219399	4415	1120	500	282	.....	.....	.....	.....	.....	.0002
.0001	181974590	4504	1131	503	283	181	126	.....	.....	56	.0001
.0000	.....	4595	1143	507	285	182	.....	.....	71	.....	.0000
K	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	K

in which σ is the standard deviation of the distribution, and N is the number of cases. A table of the size to include all the values necessary to use this complete formula would be infinitely large, as N and σ are each positive and may take any value. In order to obtain a table of usable size, we must be content with a portion of the values of the coefficient of σ in the equation just given, or

$$K = \frac{.6744898}{\sqrt{N}} \quad \ldots\ldots\ldots\ldots (2)$$

Substituting this value in equation (1), we obtain the formula,

$$PE_m = K \cdot \sigma \quad \ldots\ldots\ldots\ldots (3)$$

Table I is constructed to yield approximate values of K to the nearest fourth decimal place. In this table we find maximum values of N which correspond to such designated values of K as .0001, .0002, .0003, etc. Each such K-value is the midpoint of the intervals, K = .00005 to .00015, K = .00015 to .00025, K = .00025 to .00035, etc. respectively. N is recorded in the table as the maximum N which yields a K-value falling within that interval. Thus all N's from 4989 to 5094 inclusive yield K-values lying between .00945 to .00955; thus, the number 5094 is the largest value of N which yields, to the nearest fourth decimal place, a K-value of .0095. Any N larger than 5094, say 5095, yields a lower K-value, of .0094 or lower. In this fashion the one maximum entry 5094 in reality stands for the range of N values 4989 to 5094 inclusive. The error involved in K thus never exceeds .00005, and probably averages less than .00003.

To secure the maximum value of N for each value of K in the table, we first solve for N in equation (2),

$$N = \frac{(.6744898)^2}{K^2} \quad \ldots\ldots\ldots\ldots (4)$$

Now, the maximum value of N corresponds to the minimum value of K; that is, for the value given in Table I K = .0001, the value of K in equation (4) was taken to be the minimum of the range (.00005 — .00015) for which .0001

stands, or .00005. Since $\mathcal{N}$ is integral, all resulting decimals of the quotient in the solution of (4) are disregarded.

How to Use the Table

To find K, knowing the value of $\mathcal{N}$, the following steps are necessary:

1. Go from left to right across the top horizontal row of values in the body of Table I until the first value *smaller* than the $\mathcal{N}$ sought is found.
2. Follow down that column until $\mathcal{N}$ is found. If the actual value of $\mathcal{N}$ is not given in the table, locate the first $\mathcal{N}$ of that column which is *just as large or larger than* the sought $\mathcal{N}$. Never use the $\mathcal{N}$ smaller than the actual $\mathcal{N}$.
3. The value of K is now given by the coordinates of the $\mathcal{N}$ just located; the first two digits (tenths and hundredths places) of K are given at both the head and foot of the vertical column in which the just located $\mathcal{N}$ occurs; the second two digits (in thousandths and ten thousandths places) occur at either side of the horizontal row in which the just located $\mathcal{N}$ occurs.
4. K times σ (computed in the usual way) equals the probable error of the mean.

For example: When $\mathcal{N} = 368$:

1. Go from left to right across the top row of values in the body of the table until the first number *smaller* than 368 is found. This is located in the column headed .03.
2. Follow down this .03—column until 368 ($\mathcal{N}$) is found in row (.0052).
3. When $\mathcal{N} = 368$, K is thus .03 + .0052 = .0352. Hence, $PE_m = .0352 \times \sigma$. Again, when $\mathcal{N} = 588$, we do not find 588 in the .02 column, so we then look for the first $\mathcal{N}$ larger than 588, which turns out to be 590. Hence, when $\mathcal{N} = 588$, $K = .0278$, $PE_m = .0278 \times \sigma$.

Formula (1) is not applicable when $\mathcal{N}$ becomes too small. For small $\mathcal{N}$'s the denominator of equation (1) should be decreased, yielding a higher probable error of the mean than given by formula (1). The solution of formula (1) for $\mathcal{N}$'s less than 45 yields Table II. It may be used with the mental reservation that the true probable errors of the means for such small distributions are somewhat larger than given in the table.

The standard error of the mean may be found by multiplying the probable error of the mean by the constant,

$$\frac{1}{.6744898} = 1.4826.$$

In the computation of the probable error of the difference of two means.—The probable error of the difference of

TABLE II

SOLUTION OF FORMULA (2) FOR K, WHEN $\mathcal{N}$ IS 45 OR LESS

$\mathcal{N}$	Corresponding K	$\mathcal{N}$	Corresponding K
6.....	.2754	26.....	.1323
7.....	.2549	27.....	.1298
8.....	.2385	28.....	.1275
9.....	.2248	29.....	.1252
10.....	.2115	30.....	.1231
11.....	.2034	31.....	.1211
12.....	.1947	32.....	.1192
13.....	.1871	33.....	.1174
14.....	.1803	34.....	.1157
15.....	.1742	35.....	.1140
16.....	.1686	36.....	.1124
17.....	.1636	37.....	.1109
18.....	.1590	38.....	.1094
19.....	.1547	39.....	.1080
20.....	.1508	40.....	.1066
21.....	.1472	41.....	.1053
22.....	.1438	42.....	.1041
23.....	.1406	43.....	.1029
24.....	.1377	44.....	.1017
25.....	.1349	45.....	.1005

two means can be computed with the aid of Table I. The formula,

$$PE_{m_1 - m_2} = \sqrt{K_1^2 \cdot \sigma_1^2 + K_2^2 \cdot \sigma_2^2} \quad \ldots (5)$$

is derived from the formula,

$$PE_{m_1 - m_2} = \sqrt{PE_{m_1}^2 + PE_{m_2}^2} \quad \ldots (6)$$

The two K values, K_1 and K_2 corresponding to the two distributions respectively, are found by use of Table I. Now, square each K and multiply the square respectively by the proper σ^2; the square root of the sum of these products is the probable error of the difference of the means.

ON THE FIRING LINE

The Bureau of Special Education and Psycho-Educational Clinic, of Miami University, has been moved from Dayton, Ohio, to Columbus, Ohio. Dr. J. E. W. Wallin will continue to be Director of this Bureau.

Mansfield changed from the old 8-4 organization to the 6-3-3 at the opening of school in September. Superintendent Helter writes, "Every indication so far points to the wisdom of the reorganization. All the distinctive administration, exploratory, and social advantages are already evident."

The Board of Education of Middletown, Ohio, has requested the Bureau of Educational Research to make a school-building survey and building program for that city. This survey is to be made under the direction of Dr. T. C. Holy, of the Bureau Staff, assisted by Staff Members and students of the Bureau and the Department of School Administration. It is planned to begin this survey about November 1.

Dr. H. B. Alberty, of the Department of Principles and Practice of Education of the College of Education, has been granted a leave of absence during the Autumn and Winter Quarters to assist the State Department in its teacher-training program. Dr. Alberty was secured by the new State Director of Education, J. L. Clifton, to fill the vacancy caused by a year's leave of absence granted to Mr. C. B. Ulery. He is working with Director Clifton in an effort to equalize the teacher-training opportunities in the state and to develop recognized standards for the various institutions engaged in this work.

On September 1, 1927, the Board of Education of the City of Akron issued a tentative outline of the courses of study in Grades V through VIII. This outline is a compilation of work done by a number of committees of principals and teachers during a period of several years. After it has been tried out in the classrooms, it will be published.

Although the attendance in the elementary grades of the Cleveland schools continues to decrease slightly, the enrollment of junior and senior high schools increases rapidly. As a result of the crowding of the senior high schools the Board of Education will go forward with the erection of the John Hay High School at University Circle.

An additional instructorship, to which Mr. Paul J. Fay has been appointed, was created this fall in the Department of History of Education. Mr. Fay attended the universities of Syracuse, Missouri, and Ohio State, and received the B. S. degree in Education from the latter in 1923. After three-years experience teaching in the public schools of Ohio, he entered Teachers' College, Columbia University, where he was granted the M. A. degree in June, 1927.

A recent appointment to the staff of the Department of School Administration of the College of Education is that of Dr. D. H. Eikenberry who comes to Ohio State University from the University of Missouri. Dr. Eikenberry received both his B. A. and M. A. degrees from Indiana University and his doctorate from Teachers College, Columbia University. As Professor of School Administration, he will have charge of the courses in junior and senior high-school administration. He will also direct most of the graduate work of the rapidly increasing number of high-school principals and small-town superintendents who are specializing in secondary-school administration.

SCIENCE IN OHIO SCHOOLS

The courses of study of seventeen counties of the State were examined by eight graduate students in one of Dr. Thayer's classes, at Ohio State University, as a first step in an attempt to procure data for the construction of a science curriculum for small high schools. All sections of the State were represented.

TABLE I

SUMMARY OF THE SCIENCE COURSES GIVEN IN THE HIGH SCHOOLS OF SEVENTEEN COUNTIES OF OHIO

	Grade IX	Grade X	Grade XI	Grade XII
(1)	(2)	(3)	(4)	(5)
General Science:				
Required	12	5	.....	.....
Elective	3	3	.....	.....
Biology:				
Required	4	1	.....	.....
Elective	6	14	1	.....
Zoology:				
Elective one half-year	.....	1	.....	.....
Geography:				
Elective one half-year	1	.....	.....	.....
Elective	.....	2	.....	.....
Chemistry:				
Required	.....	.....	1	1
Elective	.....	.....	7	8
Physics:				
Required	.....	.....	1	1
Elective	.....	.....	5	15

The counties whose courses were considered were: Butler, Columbiana, Fairfield, Jefferson, Knox, Licking, Lorain, Lucas, Marion, Medina, Morgan, Portage, Preble, Ross, Stark, Summit, and Tuscarawas.

Table I shows the occurrence of science in the regular four-year high school. Judging by the few courses of study for junior high schools on file in the office of the State Department of Education, one may infer that this type of school has not generally been accepted as a part of the county systems throughout Ohio. The most common plan still is the 8-4 scheme.

Some of the schools alternated courses in odd and even years. This fact accounts for totals of more than seventeen when the numbers given for two of the subjects listed in the table are totalled. Only four of the seventeen counties followed a regular four-year plan. Most of them alternated some courses. This was especially true of chemistry and physics; general science and biology were alternated in a few schools.

General science was a required subject in the ninth year, in the majority of counties. Biology, chemistry, and physics were electives. Biology was required in only one case; and physics and chemistry were prescribed in the eleventh and twelfth years in one instance each.

The members of the Committee making this study were: Oscar Himebaugh, G. H. Chapman, C. D. Bryenton, V. D. Campbell, H. S. Dufenbaugh, J. C. Hall, Irvin H. Weaver, and Melvin R. Bixler, Chairman.

A NEW SALARY SCHEDULE FOR CINCINNATI

The Cincinnati Board of Education, at its meeting of May 16, 1927, adopted a new salary schedule, which became effective at the beginning of the present school year. This schedule divides all teachers into four groups as follows:

Group 1. Those who have had two years of normal-school preparation. These teachers will receive a minimum salary of $1,400, and may, by annual increments of $100, advance to a maximum of $2,000.

Group 2. Those who have had three years of normal-school preparation. These teachers will receive a minimum salary of $1,500 and may, by annual increments of $125, advance to a maximum of $2,500.

Group 3. Those who are college graduates. These teachers will receive a minimum salary of $1,600 and may, by annual increments of $150, advance to a maximum of $3,250.

Group 4. Those who have the equivalent of a year of professional preparation in addition to four years of college credits and who have served at least a year at the maximum of Group 3. These teachers will receive a minimum of $3,400 and a maximum of $3,500.

Since this schedule starts with the pay received by the teachers in 1926 and since the high-school teachers at the maximum were then receiving more than the elementary teachers at the maximum, the practical result of this schedule will be to permit high-school teachers to reach the new maximum in five years while a parity will not be attained by elementary teachers until the expiration of ten years. The schedule, however, makes no distinction in standard qualifications between elementary and high-school teachers.

It follows then that new teachers entering the system in any group may advance through the higher groups to the maximum. In order to do justice to the older teachers in the system, it was decided to give full credit for their original preparation and for all study of a college grade which they have taken since they began to teach. In addition to this a "service credit" equal to two units of professional preparation for each year of teaching service since the tenth year up to a maximum of thirty credits was allowed these teachers. For those who have taught for twenty-five years this allowance is equivalent to a full year of college preparation. In order to attract and retain a proper proportion of men teachers, the maximum salary for classroom teachers has been set at $3,500. A schedule is also provided for administrative officers. This schedule gives a maximum salary of $4,600 for elementary principals, $5,200 for junior high-school principals, and $6,000 for senior high-school principals. Directors and assistant directors shall have the same schedule as junior high schools. The maximum for assistant superintendents is fixed at $6,500, that of associate superintendent at $7,500, and that of the superintendent at $12,000. This schedule provides also for evening schools, summer schools, and additional compensation for special groups.

T. C. HOLY

EDUCATIONAL READINGS

SYMONDS, PERCIVAL M. *Needed Research in the Field of Measurement in Secondary Education*, *JER*, 16:119–26, September, 1927.

Secondary-school principals and teachers interested in research will find eighty suggestive problems listed in this article.

CARROTHERS, GEORGE E. *Health and Physical Efficiency of City Teachers*, *JER*, 16:184–97, October, 1927.

Married men teachers lose less time on account of illness than unmarried men, but the reverse is true with the women. Size of class, type of school, extra teaching, and so on are less potent factors in causing sickness than generally supposed. Both men and women who do extension teaching lose fewer days than men and women who do not do such extra work.

WOODY, CLIFFORD. *The Values of Educational Research to the Classroom Teacher*, *JER*, 16:172–78, October, 1927.

"Research is not merely a search for truth, but a prolonged, intensive purposeful search." The field of instruction offers many problems for research, and the teacher is the logical research worker. Values accruing from participation in research are, first, that one gets expert training in research; second, superior teaching nearly always results; third, one continues to grow professionally; fourth, teaching tends to take on the dignity of a profession; and, fifth, spiritual as well as monetary rewards follow.

JONES, VERNON A. *A Study of the Non-Verbal Nature and Validity of Myers Mental Measure*, *JER*, 16:203–9, October, 1927.

When compared with the McCall Multi-Mental Test, the Myers Mental Measure does not give significantly higher scores for children from non-English speaking homes. The validity of the Myers test is further questioned through a comparison of correlations with various criteria.

UNZICKER, S. P. *Withdrawals from Junior High School*, *JER*, 16:198–202, October, 1927.

One-fourth of all the pupils who entered junior high school did not remain to finish, and twice

NOTE.—The abbreviations used in this number are: *JER*, Journal of Educational Research; *S&S*, School and Society; *ASBJ*, American School Board Journal; *ESJ*, Elementary School Journal; *EJ*, English Journal; and *SR*, School Review.

as many boys as girls withdrew. If the pupils are divided into six groups on the basis of intelligence, it is found that there is an inverse relation between intelligence and withdrawal.

RANDALL, FLORENCE B. *A Study on the Constancy of the I. Q.* SS&S, 26:311–12, September 3, 1927.

SLOCOMBE, C. S. *Why the I. Q. Is Not, and Cannot Be, Constant,* JEP, 18:421–23, September, 1927.

Here are the reports of two recent studies on the same subject which present opposite conclusions. Miss Randall says—after 152 pupils ranging in grades from I to IX, in chronological age from 5-2 to 15-10, and in I. Q. from 70-170, had been tested from one to five times anywhere from a few weeks to five years apart—"it seems safe to state that an I. Q. properly obtained through administration of a Binet test by a competent examiner, may be used as a basis of determining the approximate I. Q. of the pupil at a future time, when a Binet test is given under comparable conditions." Mr. Slocombe, whose conclusion is found in the title of his article, bases his conclusion on a statistical analysis of certain data previously reported by Baldwin and Stecher, who tested forty children each year for six years, commencing at the age of six.

MCCALL, WILLIAM A. *What's the Matter with Psychology and Measurement?* JER, 16:179–83, October, 1927.

McCall proposes nineteen theses in accord with the title. Most of these consider the psychology of purpose with its confusing and redundant terminology and the psychology of the emotions. One conclusion is that the psychological totality of an individual is composed of a pattern consisting of four essential elements contained in the phrases "intensity of desire" and "perfection of mechanism."

BATSON, WILLIAM H., AND SHEDD, CLARENCE L. *What Types of Students Enter Teaching?* ASBJ, 75:40– September, 1927.

Two general conclusions are given. (1) Students who expect to teach stand slightly higher in scholarship than those who do not expect to teach. (2) When the number of activities in which the students are engaged is taken as a criterion of leadership, students planning to teach possess greater leadership qualities than those not planning to teach.

HAMRIN, S. A. *A Comparative Study of Ratings of Teachers-in-Training and Teachers-in-Service,* ESJ, 28:39–44, September, 1927.

The ratings given teachers-in-training do not seem to be highly predictive of success in an actual school situation. Prospective teachers were rated by supervisors of practice teaching. The next year, blank copies of the rating sheet were sent to supervisors and superintendents with the request that they rate these same teachers. A comparison of the results shows no correlation between the judgments of practice teaching supervisors and those of the supervisors in the field.

WISWALL, ZELLA E. *Improvement in Sentence Structure,* EJ, 16:518–27, September, 1927.

This study "furnishes proof that the comma blunder is due to a careless 'English habit'; that errors made in the use of the non-sentence are due to lack of knowledge rather than to carelessness; and that sentence-recognition drills are an aid in eliminating the comma-splice sentence error."

GOOD, CARTER V., AND GOOD, RAYMOND E. *Titles of Curriculum Offered or Suggested in Secondary Schools,* SR, 35:503–509, September, 1927.

The authors report that an examination of the programs of studies issued by 55 junior and senior high schools and by 14 state high schools reveal a total of 130 titles of prescribed or suggested curricula. One technical high school offered 21 curricula, while one large city system offered 22. "The median number of curricula offered is as follows: four-year high schools and senior high schools, 6; junior high schools, 4; state high-school manuals, 5; all types of schools combined, 5." The writers suggest a more uniform terminology to lessen the confusion occasioned by pupil transfers from one system to another and to clarify educational writing.

IN PAPER COVERS

CLARK, LAURA V. *A Study of Occupations Other Than Homemaking, Open to Women Trained in Home Economics.* Berkeley, California, University of California 1927. 22 pp. (University of California, Homemaking Education Series, No. 1, Leaflet No. 5)

This bulletin belongs on the shelf of books relating to the choice of a vocation. The writer surveys the occupations, other than homemaking, which are open to women trained in home economics. Five major and four minor vocations for persons who have had college training of this nature are listed. These are: teaching home economics, hospital dietitian, tea-room manager, extension worker, work with commercial firms, research work, journalism, and budget expert. The openings for the girl with only high-school training in home economics are relatively few.

UNIVERSITY OF PITTSBURGH. *Division of Research in Higher Education.* Pittsburgh, Pennsylvania, University of Pittsburgh, 1927. 24 pp. (University of Pittsburgh Bulletin, Vol. 23, No. 16)

This bulletin consists of a report of progress in cooperative research in higher education at the

University of Pittsburgh. It gives the reader an outline of the general scheme of organization followed in instituting this new division of the university. Following this outline is a descriptive list of studies, each of which is now being investigated by a committee. These studies are: (1) unit cost study of the university; (2) the junior college in western Pennsylvania; (3) educational guidance activities; (4) study of health and recreational facilities of the university; (5) study of university publicity; and (6) foundry apprentice curricula. In connection with the second study, the reader may be interested in reading a letter from Mr. Shockley, which appears in the *School Review* for September, 1927, which briefly describes the new Johnstown Junior College of the University of Pittsburgh.

STETSON, FRED LEA, AND COZENS, FREDERICK W. *The Organization and Administration of Health Education in the Secondary Schools of the United States.* Eugene, Oregon, University of Oregon, 1927. 12 pp. (Education Series, Vol. I, No. 2)

Because state departments of education do not yet appreciate what health education and its objectives are, very few states have a satisfactory health program. Such a program should include the health supervision of pupils, a comprehensive program of physical education, a program of health construction, the hygiene of the school plant, the training of teachers in health education, and the hygienic arrangement and administration of the school program.

The authors believe that an official in the department of education, or even in the health department, who can enlist the aid of other departments will accomplish much more than the usual state committee on health education.

BOOKS TO READ

WYNNE, JOHN P. *Guide to Educational and General Psychology.* New York, Globe Book Company, 1924. vii + 85 pp.

This book is a collection of questions arranged under thirty principal topics commonly considered in courses in educational and general psychology. Numerous references are given for the purpose of guiding the student in his study of the various topics. In the words of the author, "The topic headings and the general trend of the whole indicate a functional point of view. However, there is nothing to prevent the development of the more moderate or even the extreme behavioristic point of view."

CHASE, JOSEPHINE. *New York at School.* New York, Public Education Association, 1927. xii + 268 pp.

The purpose of this volume as set forth in the Preface is "An attempt only to suggest the scope of activities the schools have undertaken and to explain briefly how they grew and where they seem to be going." For a city whose school population exceeds that of Chicago, St. Louis, Detroit, Boston, and Baltimore combined, this seems a fair-sized undertaking. The general headings under which the discussion is organized are: (1) regular paths of school progress, (2) general services afforded, (3) special service afforded, (4) extended paths and bypaths, (5) keeping track of a million children, (6) the teachers of a million children, and (7) administering the schools. It is designed primarily to give the lay reader information on the operation of the school systems.

UHL, WILLIS L. *Secondary School Curricula.* New York, Macmillan Company, 1927. xx + 582 pp.

Approximately the first half of this book is historical in content, thus providing the student with a background for the study and interpretation of the more or less ubiquitous curricular problems which we are facing. The last half of the book presents a rather comprehensive survey of present-day philosophy of curricular organization and arrangement. The author has done the students of these problems a service in assembling the essential parts of a mass of relatively scattered data and in providing extensive bibliographies.

COOLEY, EDWIN J. *Probation and Delinquency.* New York, Thomas Nelson and Sons, 1927. XV + 544 pp.

This book gives an account of the work of the Probation Bureau which was established and financed by the Catholic Charities of New York in connection with the Court of General Sessions. In the progress of the experiment several thousand cases passed through the Bureau. A careful study was made of each case, various tests were given, and adequate records were kept so that it was possible to study each case in its entirety. Numerous case studies with diagnosis, prognosis, and the recommendation are presented, together with many suggestions for case analysis. This is a valuable work for all who are interested in clinical psychology.

WAGENHORST, LEWIS HACH. *The Administration and Cost of High-School Interscholastic Athletics.* New York, Teachers College, Columbia University, 1926. x + 134 pp. (Teachers College, Columbia University, Contributions to Education, No. 205)

This book shows influences and agencies which have contributed to the promotion and development of high-school athletics. The first part of the book gives a history of the development of supervision of high-school athletics. A study of the types of organization and administration maintained in the various states comprises the second part of the book. Suggestions are made which will aid greatly in putting interscholastic athletics upon a more wholesome basis, if the schools will but follow them.

NEW TESTS

A new chemistry test by Henry L. Gerry, of Boston Teachers College, is now available through Ginn and Company. The test consists of twenty-five items arranged in order of difficulty. They are arranged in booklets of thirty tests with directions, on the cover of which the key, norms, and record sheet are given.

The Iowa Silent Reading Tests have been designed to cover a wide range of skills indispensable to effective reading of the work study type. The tests measure four major aspects of silent reading ability—comprehension, organization, ability to locate information, and reading rate. The tests are somewhat longer than most workers are used to using, as they require fifty-six minutes to administer. They are for use in Grades VII–XII and are published by the Bureau of Educational Research and Service of Iowa State University.

Among the new tests that have come to our attention recently is the American Council French Grammar Test (Selection Type) which was prepared for the Modern Foreign Language Study by Professor F. D. Cheydleur, University of Wisconsin. The test is available in two forms—A and B—of approximately equal difficulty. They have been standardized on the basis of approximately ten thousand students who had had from one to eight semesters of foreign language.

The Pressey Chart for Diagnosis of Illegibilities in Handwriting is based on the analysis of approximately one thousand pieces of handwriting. The authors found sixty-three common illegibilities in letter formation and seven other general characteristics. These have been arranged in chart form so that a teacher may study the handwriting of a pupil or group of pupils for diagnostic purposes. The study on which the chart is based is reported in this Bulletin for September 28. The chart may be had through the Public School Publishing Company.

The Pupil's Guide to Correctness in Written Work for Grades III—VI by J. T. Seaton gives the important rules for capitalization, good usage, punctuation, and sentence structure which should be mastered by the pupils of these grades. The guide is intended for use in the hands of pupils, as a basis for remedial instruction. There is a teachers' manual which is to be used as a guide by the teacher. These guides are put out by the Public School Publishing Company.

The Stone Narrative Reading Tests have been reorganized to measure through types of comprehension, (1) incidents essential in developing the real point or plot, (2) incidents essential in developing steps in the plot or story, and (3) incidents that fill in or enrich the narrative in details. Speed of reading is also measured by these tests. There is a separate booklet for each of Grades IV, V, VI, and VII, and one for junior high school. The Public School Publishing Company are the distributors.

Children in the primary grades are being taught to get the thought from the printed page. The Williams Primary Reading Test (Public School Publishing Company) is designed to test their ability to do this. The first twelve items are simple instructions regarding pictures of common animals found in most primers and first readers. The remainder of the test consists of paragraphs describing familiar situations. Age and grade norms have been determined and appear on the instruction sheet.